

**Study Guide**

For use with pages 391–397

**GOAL** Find solutions of equations in two variables.**VOCABULARY**

An example of an **equation in two variables** is  $2x - y = 5$ . A **solution** of an equation in  $x$  and  $y$  is an ordered pair  $(x, y)$  that produces a true statement when the values of  $x$  and  $y$  are substituted into the equation.

The **graph** of an equation in two variables is the set of points in a coordinate plane that represent all the solutions of the equation.

An equation whose graph is a line is called a **linear equation**.

An equation that is solved for  $y$  is in **function form**.

**EXAMPLE 1** Checking a Solution

Tell whether  $(-1, 19)$  is a solution of  $5x + 6y = 100$ .

$$5x + 6y = 100 \quad \text{Write original equation.}$$

$$5(-1) + 6(19) \stackrel{?}{=} 100 \quad \text{Substitute } -1 \text{ for } x \text{ and } 19 \text{ for } y.$$

$$109 \neq 100 \quad \text{Simplify.}$$

**Answer:**  $(-1, 19)$  is not a solution of  $5x + 6y = 100$ .

**EXAMPLE 2** Finding Solutions

You are saving money for a stereo system. So far, you have \$40 saved. For every lawn you mow, you earn \$20. Use the equation  $t = 40 + 20m$ , where  $t$  represents the total amount saved and  $m$  is the number of lawns mowed.

- Make a table of solutions for the equation.
- How many lawns will you have to mow to save a total of \$400?

**Solution**

- Substitute values of  $m$  into the equation  $t = 40 + 20m$ , and find values of  $t$ . The table shows that the following ordered pairs are solutions of the equation:  $(0, 40)$ ,  $(10, 240)$ ,  $(25, 540)$

$m$	Substitution	$t$
0	$t = 40 + 20(0)$	40
10	$t = 40 + 20(10)$	240
25	$t = 40 + 20(25)$	540

- Find the value of  $m$  when  $t = 400$ .

$$400 = 40 + 20m \quad \text{Substitute 400 for } t \text{ in the equation } t = 40 + 20m.$$

$$360 = 20m \quad \text{Subtract 40 from each side.}$$

$$18 = m \quad \text{Divide each side by 20.}$$

**Answer:** You will have to mow 18 lawns to save a total of \$400.

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## Exercises for Examples 1 and 2

Tell whether the ordered pair is a solution of  $2y - 9x = -11$ .

1. (5, 17)      2. (26, 7)      3. (-1, 10)      4. (3, 8)

Make a table of solutions for the equation. Then find  $x$  when  $y = 0$ .

5.  $3x + y = 15$       6.  $4y - 5x = 16$

### EXAMPLE 3 Graphing a Linear Equation

Write  $4y - 12x = 8$  in function form. Then graph the equation.

#### Solution

To write the equation in function form, solve for  $y$ .

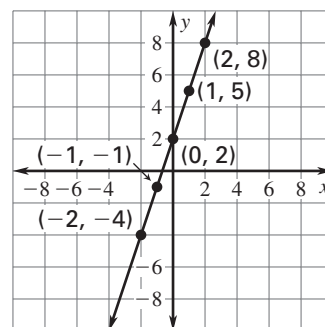
$$4y - 12x = 8 \quad \text{Write original equation.}$$

$$4y = 12x + 8 \quad \text{Add } 12x \text{ to each side.}$$

$$y = 3x + 2 \quad \text{Divide each side by 4.}$$

To graph the equation, use its function form to make a table of solutions. Graph the ordered pairs  $(x, y)$  from the table, and draw a line through the points.

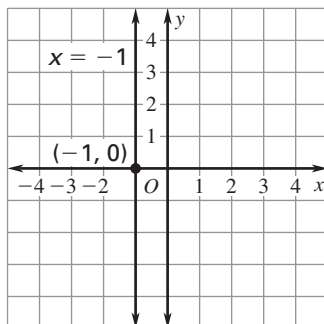
$x$	-2	-1	0	1	2
$y$	-4	-1	2	5	8



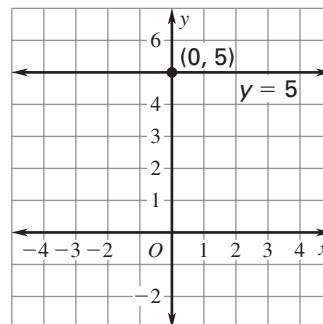
### EXAMPLE 4 Graphing Horizontal and Vertical Lines

Graph  $x = -1$  and  $y = 5$ .

- a. The graph of the equation  $x = -1$  is the vertical line through  $(-1, 0)$ .



- b. The graph of the equation  $y = 5$  is the horizontal line through  $(0, 5)$ .



## Exercises for Examples 3 and 4

Graph the equation.

7.  $5x + 2y = 10$       8.  $2y - 7x = 6$   
9.  $x = 3$       10.  $y = -7$